

## **AS802 - Graduate Research and Scholarship (Section A1) - Spring 2014**

**Class Hours:** Wednesday 2:30 pm - 4:00 pm, Room CAS 502.

**Class Dates:** Wednesday 15 January 2014 - Wednesday 30 April 2014.

Your instructor is Professor Paul Withers. I have a mailbox in CAS 506 (CSP office) and CAS 514 (AS office).

<b>Person</b>	<b>Office</b>	<b>Email</b>	<b>Phone</b>	<b>Office Hours</b>
Withers	CAS 604	withers@bu.edu	617 353 1531	By appointment

### **Course Description**

An introduction to the methods of research and scholarship required for successful graduate study and the associated ethical issues. Topics include choosing a research advisor, the research topic, scholarly writing and publishing, intellectual property, and research funding.

More succinctly – Your grad school survival kit.

A PhD program is very different from the undergraduate degree programs that you all excelled in before arriving here. One of the aims of this course is to develop the tools and wisdom that will enable you to make the most of your PhD training.

The other aim of this course is to satisfy BU's Responsible Conduct of Research (RCR) policies. RCR is defined as "the practice of scientific investigation with integrity. It involves the awareness and application of established professional norms and ethical principles in the performance of all activities related to scientific research" ([http://www.bu.edu/orc/files/2013/01/RCR\\_Plan\\_May2010.pdf](http://www.bu.edu/orc/files/2013/01/RCR_Plan_May2010.pdf)).

NSF and NIH require that BU implement mentoring and training in the responsible and ethical conduct of research for graduate students, and the Astronomy Department desires that its graduate students get such mentoring and training within the Astronomy Department. Which is why you're taking this course.

### **Resources**

(Required) On being a scientist: A guide to responsible conduct in research; National Academy of Sciences, third edition (2009)

Download for free from [http://www.nap.edu/openbook.php?record\\_id=12192](http://www.nap.edu/openbook.php?record_id=12192)

(Excerpts will be provided) The art of being a scientist: A guide for graduate students and their mentors; Roel Snieder and Kenneth L Larner; Cambridge University Press, 2009.

ISBN-10: 0521743524

ISBN-13: 978-0521743525

(Excerpts will be provided) A PhD is not enough: A guide to survival in science; Peter J Feibelman, Basic Books, 2011.

ISBN-10: 0465022227

ISBN-13: 978-0465022229

Other resources will be introduced during the class, including some from  
<http://www.bu.edu/orc/rcr/>  
<http://oprs.usc.edu/education/rcr/>  
<http://ccnmtl.columbia.edu/projects/rcr/>  
<http://www.phdcomics.com/>

This course has a Blackboard site ([learn.bu.edu](http://learn.bu.edu)).

### **Assignments**

Submitted NESSF proposal – 25%

CV – 10%

Professional website – 10%

Report on a past research project – 25%

Additional RCR training – 10%

Class participation – 20%

### **Possible Due Date**

Monday 3 February

26 February

02 April

23 April

30 April

These dates are not yet fixed, use them only as a rough guide to plan your semester

### Submitted NESSF proposal (25%)

Money makes the world go round, including scientific research. It's very hard to make great discoveries if no-one is paying you to do so. Convincing others that they should support you in your plans to explore the universe is another important part of the modern scientific enterprise. After completion of a PhD program, it is extremely important. Even before completing a PhD, it can be highly valuable. In particular, it is useful to make the inevitable beginners' mistakes before your career depends on not doing so. There is a NASA graduate fellowship program that you are all eligible for with a proposal deadline of Monday 3 February. I know this deadline is close to the start of the semester, but the funding agencies are not governed by your schedules – welcome to the real world. Miss this date and you'll need another source of a year's funding. **You will develop a plan for a research project, then submit a proposal to this fellowship opportunity.**

### CV (10%)

A curriculum vitae (CV) is essential beyond the PhD program and often useful within a PhD program. Developing a basic CV long before you need it, then regularly updating it reduces the pain of writing an entire CV on a blank sheet of paper at the end of your PhD program. It also gives you a mechanism by which to keep track of all your noteworthy activities and accomplishments, rather than having forgotten most of them when you need to list them. **You will prepare a CV.**

### Professional website (10%)

The first thing that you do when you want to know more about a scientist or their research is visit their website. This will be essential when you're looking for jobs after graduation and it will also be useful now to reviewers of fellowship applications, people

interested in your conference presentations, and reviewers of your submitted manuscripts. **You will create a professional website.**

#### Report on a past research project (25%)

It's no use making great discoveries if no-one else knows about them. One of the most important ways research discoveries are communicated is in written reports. They come in many styles and lengths – your dissertation will be a very long example of such a report. Writing and publishing papers throughout your graduate career is also important for your subsequent success, yet this is not something your undergraduate training has prepared you for. Word is lousy for scientific writing, which is why LaTeX is a commonly used word processing package in the sciences. **You will write a short scientific manuscript using LaTeX that is formatted in the style of one of the major journals in our field and that describes the results of a past or current research project.**

#### Additional RCR training (10%)

BU's basic RCR requirements for graduate students include some online exercises and four face-to-face workshops. This course can replace the four workshops, but not the online modules. If you miss a class session, then this course alone may no longer satisfy the RCR workshop requirements. **You will complete some online exercises and attend one workshop.**

#### Class participation (20%)

Finally, oral communication is a part of the process of science. Accordingly, the class will be structured to involve ample discussions, especially case studies. Grading of your participation will ensure sufficient contributions to these discussions – and reward cogent and coherent comments. Any small impromptu assignments arising during this course will be included within this “class participation” segment of your grade. **Your participation in class activities will be graded.**

#### Late policy

Late NESSF proposals will not be accepted (NASA policy). Other late assignments will have 15% of the maximum possible score deducted for each day they are overdue.

## Planned Schedule

This is the plan, but it is subject to change.

<u>Date</u>	<u>Number</u>	<u>Description</u>
Wednesday 15 January	1	RCR overview and NESSF introduction
Wednesday 22 January	2	NESSF strategies and an overview of your PhD
Wednesday 29 January	3	Mentor/trainee responsibilities & finding an advisor
Wednesday 05 February	4	Data acquisition, etc and NESSF discussion
Wednesday 12 February	5	Publication practices and CVs
Wednesday 19 February		ACADEMIC MONDAY
Wednesday 26 February	6	Peer review
Wednesday 05 March	7	CV discussion
Wednesday 12 March	8	Collaborative science and professional websites
Wednesday 19 March		SPRING BREAK
Wednesday 26 March	9	LaTeX and creating a research project
Wednesday 02 April	10	Ethics and professional websites
Wednesday 09 April	11	Research misconduct and draft LaTeX reports
Wednesday 16 April	12	Conflicts of interest
Wednesday 23 April	13	RCR synthesis
Wednesday 30 April	14	Research report discussion

Most of the “A and B” descriptions mean ~1 hour on the first RCR-related item and ~30 minutes on the second item that is less directly connected with our RCR activities.